

INTRODUCTION TO DISCRETE MATHEMATICS. TEST #1

1. Verify if the following formulas are tautologies:

$$(p \vee (q \wedge r)) \Rightarrow ((r \vee p) \wedge (p \vee q))$$

$$((p \Leftrightarrow q) \Leftrightarrow (p \Leftrightarrow p)) \Leftrightarrow (p \Leftrightarrow (q \Leftrightarrow p))$$

2. Find the union  $\bigcup_{n \in \mathbb{N} \cup \{0\}} A_n$  and intersection  $\bigcap_{n \in \mathbb{N} \cup \{0\}} A_n$  of the sets

$$A_n = \left\langle 2 - \frac{1}{n^2 - 3}; 5 - \frac{1}{n + 2} \right\rangle.$$

3. Let  $X = \{21, 23, 25, \dots, 279\}$  be the set of odd integers lying between 20 and 280. Find the number of elements of the following set:

$$Y = \{n \in X : ((3|n) \Rightarrow (n = 165)) \vee ((11|n) \Rightarrow (n = 165))\}$$